

**AMENDMENTS TO THE CLAIMS:**10/501195  
DT04 Rec'd PCT/PTO 09 JUL 2004

Kindly amend claims 3-9, 15, 17 and 19-24, as shown below.

This listing of claims will replace all prior versions and listings of claims in the Application:

**Claim 1 (original):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere; and

pouring the microsphere into the hole together with conductive liquid to mount the microsphere on the pad.

**Claim 2 (original):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a mask with a penetrating hole formed at the respective pad positions to mount the microsphere, the mask being held on the semiconductor device to allow the hole to be disposed on the pad; and

pouring the microsphere into the hole together with conductive liquid to mount the microsphere on the pad.

**Claim 3 (currently amended):** A microsphere arranging apparatus, comprising:

HAYES SOLOWAY P.C.  
130 W. CUSHING STREET  
TUCSON, AZ 85701  
TEL. 520.882.7623  
FAX. 520.882.7643

175 CANAL STREET  
MANCHESTER, NH 03101  
TEL. 603.668.1400  
FAX. 603.668.8567

a ~~mounting means~~ base for mounting a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying ~~the microsphere~~ microspheres together with the stored conductive liquid to ~~[[the]]~~ a semiconductor device mounted on the base ~~mounting means~~; and

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres supplied from the storing ~~[[means]]~~ container to the semiconductor device.

**Claim 4 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting means~~ base for mounting a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying ~~the microsphere~~ microspheres together with the stored conductive liquid to ~~[[the]]~~ a semiconductor device mounted on the base ~~mounting means~~;

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres supplied from the ~~storing means~~ storage container to the semiconductor device;

HAYES SOLOWAY P.C.  
130 W. CUSHING STREET  
TUCSON, AZ 85701  
TEL. 520.882.7623  
FAX. 520.882.7643

175 CANAL STREET  
MANCHESTER, NH 03101  
TEL. 603.668.1400  
FAX. 603.668.8567

a tube that connects between the ~~storing means~~ storage container and the retaining  
[[means]] device; and

a pump [[means]] that is built in the tube to transport [[the]] conductive liquid  
containing [[the]] ~~microsphere~~ microspheres [[being]] retained in the retaining [[means]] device  
to the ~~storing means~~ storage container.

**Claim 5 (currently amended):** The microsphere arranging apparatus according to claim 4,  
wherein:

the pump [[means]] comprises a base, a rotating ~~means to rotate~~, body and a plurality of  
rollers that are rotatably attached to the circumference of the rotating [[means]] body;

the tube is a flexible tube disposed between the roller and the base; and

a clearance between the roller and the tube disposed is provided so as to have a gap that  
allows [[the]] ~~microsphere~~ microspheres contained in the conductive liquid to pass through  
inside the tube while having its original shape when the tube is pressed by the rotation of the  
roller.

**Claim 6 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting means~~ base for mounting a semiconductor device that includes a  
semiconductor wafer with a predetermined semiconductor element and an interconnection and  
with a number of pads connected the interconnection and attached on a surface of the  
semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective  
pad positions to mount the microsphere so as to allow the hole to be disposed on the pad;

a ~~storing means~~ storage container for storing conductive liquid containing a number of  
microspheres and for supplying the ~~microsphere~~ microspheres together with the stored

conductive liquid through the mask to ~~[[the]]~~ a semiconductor device mounted on the ~~mounting~~  
~~means~~ base; and

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~  
~~microsphere~~ microspheres supplied from the ~~storing-means~~ storage container to the  
semiconductor device.

**Claim 7 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting-means~~ base for mounting a semiconductor device that includes a  
semiconductor wafer with a predetermined semiconductor element and an interconnection and  
with a number of pads connected the interconnection and attached on a surface of the  
semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective  
pad positions to mount the ~~microsphere~~ microspheres so as to allow the hole to be disposed on  
the pad;

a ~~storing-means~~ storage container for storing conductive liquid containing a number of  
microspheres and for supplying ~~the-microsphere~~ microspheres together with the stored  
conductive liquid through the mask to the semiconductor device mounted on the ~~mounting~~  
~~means~~ base;

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~  
~~microsphere~~ microspheres supplied from the ~~storing-means~~ storage container to the  
semiconductor device;

a tube that connects between the ~~storing-means~~ storage container and the retaining  
~~[[means]]~~ device; and

HAYES SOLOWAY P.C.  
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FAX. 603.668.8567

a pump ~~[[means]]~~ that is built in the tube to transport ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres being retained in the retaining ~~[[means]]~~ device to the ~~storing-means~~ storage container.

**Claim 8 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting-means~~ base for mounting a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

a ~~storing-means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying ~~[[the]]~~ ~~microsphere~~ microspheres together with the stored conductive liquid to the semiconductor device mounted on the ~~mounting-means~~ base;

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres supplied from the ~~storing-means~~ storage container to the semiconductor device;

a tube that connects between the ~~storing-means~~ storage container and the retaining ~~[[means]]~~ device; and

a ~~vertical-movement-means~~ lift that allows the ~~storing-means~~ storage container to move to a position above or below the retaining ~~[[means]]~~ device.

**Claim 9 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting-means~~ base for mounting a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the

semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective pad positions to mount the microsphere so as to allow the hole to be disposed on the pad;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying ~~the microsphere~~ microspheres together with the stored conductive liquid through the mask to ~~[[the]] a~~ semiconductor device mounted on the ~~mounting means~~ lift;

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres supplied from the ~~storing means~~ storage container to the semiconductor device;

a tube that connects between the ~~storing means~~ storage container and the retaining ~~[[means]]~~ device; and

a ~~vertical movement means~~ lift that allows the ~~storing means~~ storage container to move to a position above or below the retaining ~~[[means]]~~ device.

**Claim 10 (original):** A semiconductor device, comprising:

a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer; and

a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere,

wherein the resist has a thickness that allows the microsphere to be retained in the hole and prevents the two or more microspheres from being entered therein.

**Claim 11 (original):** A semiconductor device, comprising:

a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer; and

a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere,

wherein a minimum diameter of the hole to be generated due to a manufacture accuracy of the hole is made to be greater than a value obtained by adding a gap to a maximum diameter of the microsphere, and a maximum diameter of the hole is made to prevent the two or more microspheres from being entered into the one hole and prevent the microsphere from being released from the pad.

**Claim 12 (original):** A semiconductor device, comprising:

a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer; and

a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere,

wherein the resist has a thickness that allows the microsphere to be retained in the hole and prevents the two or more microspheres from being entered therein, a minimum diameter of the hole to be generated due to a manufacture accuracy of the hole is made to be greater than a value obtained by adding a gap to a maximum diameter of the microsphere, and a maximum diameter of the hole is made to prevent the two or more microspheres from being entered into the one hole and prevent the microsphere from being released from the pad.

**Claim 13 (original):** A semiconductor device, comprising:

a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer; and

a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere,

wherein the resist has a thickness that allows a plurality of the microspheres to be accommodated in the hole.

**Claim 14 (original):** A semiconductor device, comprising:

a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer; and

a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere,

wherein the hole is formed tapered such that the semiconductor wafer side is wider than the resist surface side.

**Claim 15 (currently amended):** A semiconductor device, comprising:

a semiconductor wafer with a pad formed in a predetermined pattern on its surface;

a resist formed on the semiconductor wafer and having a hole formed in the predetermined pattern at a corresponding position to the pad; and

a microsphere accommodated in the hole,

wherein the hole is provided with a relief [[means]] to release a conductive liquid and a gas left in the hole outside the hole when the microsphere is supplied together with the conductive liquid.



**Claim 16 (original):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere; and

pouring the microsphere into the hole together with conductive liquid while rotating the semiconductor device to mount the microsphere on the pad.

**Claim 17 (currently amended):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

disposing the semiconductor device to be inclined; and

pouring the microsphere into the hole together with conductive liquid while oscillating an ejection [[means]] device for ejecting the microsphere together with the conductive liquid between one end to the other end of the semiconductor device over the inclined semiconductor device so as to mount the microsphere on the pad.

**Claim 18 (original):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads

connected the interconnection and attached on a surface of the semiconductor wafer, and a mask with a penetrating hole formed at the respective pad positions to mount the microsphere, the mask being held on the semiconductor device to allow the hole to be disposed on the pad; and

pouring the microsphere into the hole together with conductive liquid while rotating the semiconductor device to mount the microsphere on the pad.

**Claim 19 (currently amended):** A method of arranging microspheres with liquid, comprising the steps of:

providing a semiconductor device that includes a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a mask with a penetrating hole formed at the respective pad positions to mount the microsphere, the mask being held on the semiconductor device to allow the hole to be disposed on the pad;

disposing the semiconductor device to be inclined; and

pouring the microsphere into the hole together with conductive liquid while oscillating an ejection [[means]] device for ejecting the microsphere together with the conductive liquid between one end to the other end of the semiconductor device over the inclined semiconductor device so as to mount the microsphere on the pad.

**Claim 20 (currently amended):** A microsphere arranging apparatus, comprising:

a mounting-rotating [[means]] base for mounting a semiconductor device and for rotating the semiconductor device mounted, the semiconductor device including a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the

semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying the ~~microsphere~~ microspheres together with the stored conductive liquid to the semiconductor device mounted on the mounting-rotating ~~[[means]]~~ base; and

a retaining ~~[[means]]~~ device for retaining ~~[[the]]~~ conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres supplied from the ~~storing means~~ storage container to the semiconductor device.

**Claim 21 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting means~~ base for mounting a semiconductor device while disposing the semiconductor device to be inclined, the semiconductor device including a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and a resist formed on the semiconductor wafer and having a penetrating hole formed at the respective pad positions to mount the microsphere;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres;

a first ejection tube for ejecting ~~[[the]]~~ ~~microsphere~~ microspheres together with the conductive liquid;

an ~~oscillating means~~ oscillator for oscillating the first ejection tube between one end to the other end of the semiconductor device over the semiconductor device inclined; and

a retaining ~~[[means]]~~ device for retaining the conductive liquid containing ~~[[the]]~~ ~~microsphere~~ microspheres ejected from the first ejection tube to the semiconductor device.

**Claim 22 (currently amended):** A microsphere arranging apparatus, comprising:

a mounting-rotating ~~[[means]]~~ base for mounting a semiconductor device and for rotating the semiconductor device mounted, the semiconductor device including a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective pad positions to mount the microsphere so as to allow the hole to be disposed on the pad;

a ~~storing-means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying the ~~microsphere~~ microspheres together with the stored conductive liquid to the pad on the semiconductor device mounted on the mounting-rotating ~~[[means]]~~ base; and

a retaining ~~[[means]]~~ device for retaining the conductive liquid containing the microsphere supplied from the ~~storing-means~~ storage container to the pad.

**Claim 23 (currently amended):** A microsphere arranging apparatus, comprising:

a ~~mounting-means~~ base for mounting a semiconductor device while disposing the semiconductor device to be inclined, the semiconductor device including a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective pad positions to mount the microsphere so as to allow the hole to be disposed on the pad;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres;

a first ejection tube for ejecting the ~~microsphere~~ microspheres together with the conductive liquid;

an ~~oscillating means~~ oscillator for oscillating the first ejection tube between one end to the other end of the semiconductor device over the pad of the semiconductor device; and

a retaining ~~[[means]]~~ device for retaining the conductive liquid containing the microsphere ejected from the first ejection tube to the pad.

**Claim 24 (currently amended):** A microsphere arranging apparatus, comprising:

a mounting-rotating ~~[[means]]~~ base for mounting a semiconductor device and for rotating the semiconductor device mounted, the semiconductor device including a semiconductor wafer with a predetermined semiconductor element and an interconnection and with a number of pads connected the interconnection and attached on a surface of the semiconductor wafer, and for holding a mask with a penetrating hole formed at the respective pad positions to mount the microsphere so as to allow the hole to be disposed on the pad;

a ~~storing means~~ storage container for storing conductive liquid containing a number of microspheres and for supplying the ~~microsphere~~ microspheres together with the stored conductive liquid to the pad on the semiconductor device mounted on the mounting-rotating ~~[[means]]~~ base;

a retaining ~~[[means]]~~ device for retaining the conductive liquid containing ~~[[the]]~~ microsphere microspheres supplied from the ~~storing means~~ storage container to the pad;

a tube that connects between the ~~storing means~~ storage container and the retaining ~~[[means]]~~ device; and

a ~~vertical movement means~~ lift that allows the ~~storing means~~ storage container to move to a position above or below the retaining ~~[[means]]~~ device.

**HAYES SOLOWAY P.C.**  
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